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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,154	02/27/2004	Dennis S. Greywall	35-19	9017

7590 02/06/2007  
Docket Administrator (Room 3J-219)  
Lucent Technologies Inc.  
101 Crawfords Corner Road  
Holmdel, NJ 07733-3030

EXAMINER
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LAMBELET, LAWRENCE EMILE

ART UNIT	PAPER NUMBER
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1732

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/06/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/789,154

Applicant(s)

GREYWALL ET AL.

Examiner

Lawrence Lambelet

Art Unit

1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15-21 and 28-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13, 15-21, and 28-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

Applicant's amendment under 37 CFR §1.111, filed 11/16/2006, is considered in this Office Action. The previous Non-Final Office Action, filed 7/19/2006, rejected claim 11 under 35 USC §112, both first and second paragraphs. Claim 11 was also objected to for a minor informality. The rejections and objection of claim 11 under this section are hereto withdrawn in view of amendment and argument.

Furthermore, the specification objection is withdrawn in view of amendment thereto.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 10-12, and 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lobovsky et al (U.S. Patent 6,682,677), and further in view of Yodh et al (U.S. Patent Application Publication 2006/0099135).

Lobovsky et al, hereafter "Lobovsky", discloses a method of assembling carbon particles into fibers, as recited in claims 1 and 19. Lobovsky teaches flowing a liquid containing a dispersion of carbon particles through a tapering tube at lines 28-35 in

Art Unit: 1732

column 5, lines 59-63 in column 5, and in Fig. 4. At the same citation, Lobovsky further teaches dispersing carbon particles in the mixture, as required by claim 2. The carbon particles of Lobovsky are nanotubes, as required by claims 12 and 20. Lobovsky also teaches spooling a fiber on a take-up drum, as required by claim 10, in Fig. 11.

Lobovsky does not teach using a curable liquid and curing the liquid near the end of the tapering tube, as required by claims 1 and 19, or partially curing at locations before and after the end, as required by claims 16 and 18. Lobovsky also does not teach using a UV curable liquid, as required by claim 11, or using UV light to cure, as required by claims 3 and 15, or providing UV translucency, as required by claim 17.

Yodh et al, hereafter "Yodh", does teach using a curable precursor in paragraph [0077]. One of ordinary skill in the art would have found it obvious to locate the curing event near the end of the tube, instead of upstream where a solid mass formed too soon would clog the tube, or downstream where a free-flowing liquid stream would break apart. It would have been further obvious to one of ordinary skill that the curing event could bridge the end of the tube in a relatively narrow region by progressively proceeding from partial cure to full such that the phase transition neither blocks nor necks.

Yodh further teaches using UV light, and by implication a UV curable precursor, in paragraph [0094]. It would have been obvious to one of ordinary skill in the art to provide the tube with translucency to UV light in order to partially cure before the end of the tube.

Lobovsky and Yodh are combinable because they are concerned with a similar technical field, namely, carbon nanotube filaments. One of ordinary skill in the art at the time of the invention would have found it obvious to include in the method of Lobovsky the curable matrix of Yodh, and would have been motivated to do so to eliminate process steps, such as coagulating and drying the fiber.

Claims 4 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lobovsky in view of Yodh, as applied to claims 1-3, 10-12, and 15-20 above, and further in view of Smalley et al (U.S. Patent Application Publication 2002/0159943).

Lobovsky and Yodh disclose the method of claims 1-3, 10-12, and 15-20, as discussed above.

Lobovsky and Yodh do not teach heating the fiber, as required by claim 7, or heating to drive off volatiles, as required by claim 4, or heating to sinter, as required by claim 8. Lobovsky and Yodh further do not teach increasing the density, as required by claim 6.

Smalley et al, hereafter "Smalley", does teach heating carbon nanotube mixtures to remove carbon contaminates in the Abstract. Removing the contaminates from the mix would create denser packing of nanotubes. Applying heat to temperatures near the melting point of the fiber would be an obvious matter of choice for one skilled in the art. Doing so would involve sintering of at least some of the carbon particles.

Lobovsky, Yodh and Smalley are combinable because they are concerned with a similar technical field, namely, carbon nanotube assemblies. One of ordinary skill in the art at the time of the invention would have found it obvious to include in the method of

Lobovsky and Yodh the purification and consolidation techniques of Smalley, and would have been motivated to do so to strengthen the resulting fiber.

Claims 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lobovsky in view of Yodh, as applied to claims 1-3, 10-12, and 15-20 above, and further in view of Islam et al (U.S. Patent Application Publication 2005/0054830).

Lobovsky and Yodh disclose the method of claims 1-3, 10-12, and 15-20, as discussed above.

Lobovsky and Yodh do not disclose a step of twisting, as required by claim 5.

Islam et al, hereafter "Islam" does disclose a process of twisting to make fiber in paragraph [0032].

Lobovsky, Yodh and Islam are combinable because they are concerned with a similar technical field, namely, fiber extrusion. One of ordinary skill in the art at the time of the invention would have found it obvious to include in the method of Lobovsky and Yodh the method to change morphology, as taught by Islam, and would have been motivated to do so to enhance the binding forces in the fiber.

Lobovsky and Yodh do not disclose a step of cladding, as required by claim 9.

Islam does teach a step of coating, or otherwise cladding, in paragraph [0017].

One of ordinary skill in the art at the time of the invention would have found it obvious to include in the method of Lobovsky and Yodh the finish treatment of Islam, and would have been motivated to do so to enhance process-ability of the fiber.

Claims 13 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lobovsky in view of Yodh, as applied to claims 1-3, 10-12, and 15-20 above, and further in view of Ko et al (U.S. Patent Application Publication 2005/0228110).

Lobovsky and Yodh disclose the method of claims 1-3, 10-12, and 15-20, as discussed above.

Lobovsky and Yodh do not teach carbon particle composition as fibrils.

Ko et al, hereafter Ko, does teach a fibril composition in the Abstract.

Lobovsky, Yodh and Ko are combinable because they are concerned with a similar technical field, namely, carbon nanotube filaments. One of ordinary skill in the art at the time of the invention would have found it obvious to include in the method of Lobovsky and Yodh the longer length structure of Ko, and would have been motivated to do so to reinforce the fiber.

Claims 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lobovsky in view of Yodh, Smalley, Islam, and Ko, as applied to claims 1-13, and 15-21 above.

Lobovsky, Yodh, Smalley, Islam and Ko disclose the method of claims 1-10, 12-13, and 15-21, as discussed above.

Specifically, Lobovsky teaches flowing a liquid containing a dispersion of carbon particles through a tapering tube, as required by claim 28, at lines 28-35 in column 5, lines 59-63 in column 5, and in Fig. 4. Lobovsky further teaches carbon nanotubes, as required by claim 30, at the same citation.

Yodh teaches curing using UV light, as required by claim 28, in paragraph [0094]. One skilled in the art would have found it obvious to cure near the second end of the tube.

Smalley teaches heating the fiber to drive off volatiles, as required by claim 28, in the Abstract. Heating to the point of sintering would have been obvious as a matter of choice for one skilled in the art.

Islam teaches a step of twisting, as required by claim 28, in paragraph [0032]. Islam further teaches a step of coating, or cladding, as required by claim 29, in paragraph [0017].

Ko teaches carbon particles as fibrils, as required by claim 31, in the Abstract.

Lobovsky, Yodh, Smalley, Islam and Ko are combinable because they are concerned with a similar technical field, namely, carbon particulate assemblies. The motivations for one of ordinary skill in the art at the time of the invention to make these combinations would include eliminating process steps, strengthening the fiber, enhancing process-ability of the fiber, and reinforcing the fiber.

### ***Response to Arguments***

Applicant's arguments filed 11/16/2006 have been fully considered but they are not persuasive.

With respect to enablement (35 USC §112), applicant argues that the description "PS2067" is sufficiently clear and concise. The argument is moot in view of the



withdrawal. Without conceding applicant's point, the record is clarified with a URL address.

With respect to merit (35 USC §103(a)), applicant argues that Lobovsky teaches a spinning process, which is distinct from the claimed process, and that the previously filed restriction made this distinction by offering gel-spinning as prima facie evidence of a different process.

In response, it is not the process of forming a solid fiber taught by Lobovsky, but the process of orienting the carbon particles through a tapering tube that reads on obviousness. One can expect the reference to have differences with the claimed subject matter, otherwise a question of anticipation, rather than that of obviousness, would have been pursued. The scope of Lobovsky, that of assembling carbon nanotubes (particles) into fibers, is appropriately matched to that of the independent claims 1, 19 and 28. The Yodh reference teaches an alternative process which cures the deficiency in the Lobovsky reference, as discussed in the rejection section above. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Applicant argues that the motivation to combine Lobovsky and Yodh, that of eliminating the coagulation and drying steps of the Lobovsky by substituting a curable

resin matrix with curing means taught by Yodh, is deficient on the ground that coagulation is fundamental to the spinning process.

In response, the motivation would have been the simplification of the process of assembling a carbon nanotube fiber achieved by eliminating downstream steps through process change. One of ordinary skill would have recognized that the same end was served, but more efficiently done. Such simplification is a motivation in and of itself, and does not constitute impermissible hindsight.

The following sentence in the previous Office Action was not clear to applicant: "It would have been further obvious to one of ordinary skill that the curing event could bridge the end of the tube in a relatively narrow region by progressively proceeding from partial cure to the full such that the phase transition neither blocks nor necks. Regrettably, this was a clumsy way of saying that it would have been obvious that there was a zone of curing, defined by blocking in the tube and breaking away out of the tube, such that partial curing could occur both inside the tube and outside the tube.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence Lambelet whose telephone number is 571-272-1713. The examiner can normally be reached on 8 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


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Application/Control Number: 10/789,154

Page 11

Art Unit: 1732

1/28/2007

  
CHRISTINA JOHNSON  
SUPERVISORY PATENT EXAMINER

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